

THE PHYLOGENY OF THE DOCOGLOSSA.

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In his concluding fasciculi contributed to complete Troschel's classical "Gebiss der Schnecken" Dr. Johannes Thiele dissents very emphatically from some suggestions of mine in regard to the derivation of the true Limpets, made many years ago. At that time it appeared to me that the *Lepetidae* might represent the stem, somewhat degenerated, from which the *Docoglossa* were derived. While I attach, even in the present state of our knowledge, comparatively little importance to speculations of this kind, which can only be placed on a firm footing by extended embryological researches, it still seems to me that there is a solid basis for the hypothesis which I then suggested.

There can be little doubt that the early type of Gastropod gill was situated much as in *Fissurella* on the "back of the neck" behind the head and that it was constituted of a stem with lateral lamellæ. Originally paired and symmetrical, by circumstances incident to growth and torsion one gill of the pair has in most cases become aborted, though its "smelling organ" frequently remains, as in the limpets. There is also no doubt whatever that the Protolimpet was derived from a form having a spiral shell. I have shown that *Propilidium* by its dentition is closely allied to *Lepeta*. Now *Propilidium* is said to have two gills but certainly has at least one, of the type of *Acmaea*. It retains a spiral nucleus through life, though it is partly cut off by a small septum which is never completed. Other *Lepetidae* also show a spiral nucleus when very young, but it is cut off completely and lost later. These other, mostly deep or cold water forms, have lost their gills and eyes by degeneracy and the principal teeth of the radula show a tendency to become cemented together, while in *Propilidium* they are more or less isolated. Now in the *Acmaeidae* and *Patellidae* the nucleus is limpet-shaped from the beginning; the uncinial teeth (well developed in *Lepeta*) are degenerate and often lost in the *Acmaeas* but appear again in the *Patellas*, not, however with the individuality and completely chitinous nature which is found in the corresponding teeth of *Lepetidae*. We find therefore in *Lepetidae* the greatest number of archaic characters (somewhat masked by degeneration of other organs) which

remain in any of the three groups, and whether most ancient or not, so far as these characters go the *Lepetidae* are nearest to the Protolimpet.

In my work on the Blake Mollusks (II, p. 436) I said that *Acmaeidae*, of all the groups of *Docoglossa*, is the most typical; that is, within the limits of that family are found assembled, sometimes in one and the same animal, the greatest number of organs which taken singly are characteristic of *Docoglossa*. This is strictly true, but Dr. Thiele (Gebiss, p. 340, vol. II) has mistranslated me to the extent of saying that I have regarded the *Acmaeidae* as the most "primitive" group, in opposition to my earlier views; which is quite inaccurate. I have in the Blake Gastropods (p. 436-7) shown why the *Patellidae* may reasonably be regarded as derived from *Acmaeidae*, the original ctenidia having been wholly lost. The row of lamellæ within the mantle edge have taken up the branchial function and in some species, as in *Ancistomesus*, become arborescent proliferations. The branchial cordon is occasional in *Acmaeidae*, I have seen it complete in *Scurria mesoleuca*; it is present but incomplete in the common *Lottia gigantea* of California; and even if Dr. Thiele was correct in supposing that it was absent in *Scurria scurra* there would still be no ground for his conclusion that its absence in the latter species indicates a failure of the grounds upon which I united in one group, as *Proteobranchiata*, the *Acmaeidae* and *Patellidae*.

But there is excellent reason for believing Dr. Thiele to have been misled by an exceptionally contracted specimen of *Scurria scurra* and to be entirely wrong in his conclusion that the species is without a branchial cordon. The latter is figured and described by Orbigny from living specimens (Am. MÉR., p. 478, pl. 64, figs. 11-14). I have seen sketches by Couthouy made from life fully confirming Orbigny, and lastly I have seen, but do not now remember where, an alcoholic specimen which showed them clearly. Dr. Thiele's specimen only appeared "etwas wulstig," somewhat puffed up, in the place where the cordon should be, but there can be no doubt that this puffing up simply represented the alcoholically contracted lamellæ of the cordon, rendered indistinct by improper preparation.

Many of the minor details in which Dr. Thiele's observations differ from mine may be reasonably explained by the variation which is exhibited by individuals; and my chief criticism upon what is, in the main, a praiseworthy and useful work is that Dr. Thiele has failed to take account of this factor, which more extensive experience

with the radula of a single species would have undoubtedly revealed to him. The result has been, not only has he estimated too highly the constancy of minor details of the radula in single species, but he has made an excessive number of so-called "generic" distinctions, the names of which in many cases will simply enlarge our catalogues of synonyms.

In conclusion I may point out that the relations of the radula in *Lepetella* to that of *Lepeta*, etc., offer additional reasons for thinking that the *Lepetidae* are of the limpets those most nearly allied to normal or more usual types of gastropods, and also that the similarity of the shell of the silurian *Tryblidium* to that of some recent limpets (*Olana*, etc.) by no means authorizes us to conclude that the soft parts of *Tryblidium* were also similar to those of recent *Patellide*. Indeed, when the almost incalculable length of time intervening between our days and the Silurian is considered, together with the similarity of recent limpet shells which are secreted by widely different animals, it is almost inconceivable that the Silurian form should have any closely allied recent representative. The rhythmical manner in which the adductor scars of *Tryblidium* are arranged in pairs, clearly indicates a peculiar disposition of the organs which might, indeed, have paralleled in some particulars the organization of some of the *Chitons* of that ancient time.

° For the rest, many of the ancient limpets are represented by shells which might well have belonged to *Lepeta* or *Acmea*, yet of the relations of which, as in the case of many recent limpets, we are not permitted to arrive at any dogmatic opinion for want of the requisite data, a deficiency which, in the case of the fossils, must remain forever unsupplied.